UNITED STATES PATENT APPLICATION FOR:

METHOD FOR MORTGAGE FRAUD DETECTION

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5   SPECIFICATION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a method of detecting fraud in loan application. More particularly, the present invention relates to a method of
10   estimating the risk associated with a contemplated loan, and especially to estimating the risk that a lender may be induced to rely on an unrealistically high estimate of the value of the real property that is to secure the loan.

Description of the Related Art

For the purpose of controlling the risk associated with lending money
15   secured by real property, a loan originator attempts to estimate the value of the property being used to secure the note. Traditionally, the originator paid an appraiser, who was supposed to be knowledgeable in the type of real property in question and skilled in comparing such properties, and relied on the appraiser's estimate of the market value of the real property in order to limit
20   the risk that value would be inadequate to secure the note. The use of appraisals continues. In recent years, lenders who wish to rely less on the

appraisal have begun using "automated valuation models" ("AVMs"), methods of estimating the market value of a property based on various methodologies such as price indexing methods, hedonic models, adjusted tax assessed value models, and hybrid models.

5   A lender may also inquire whether the property has undergone certain patterns of frequent sales, loans or refinancings which have, in that lender's experience, come to be associated with attempts to cause artificially high estimates of the value of the property. Additionally, the lender may investigate the creditworthiness of the person applying for the loan. Finally, the lender

10   might seek out information about the applicant's history, taking a particular interest in whether the applicant has been involved in a cluster of activities involving real property in the neighborhood.

Thus, existing methods for fraud detection tend to emphasize either or both of (1) the history of the subject property (the property proposed for a sale

15   or loan), with a special view to any possible "flipping" (rapid series of sales, loans, or refinances), and (2) the history and creditworthiness of the applicant, with a special view to any other transactions in the neighborhood of the subject property.

These methods are not infallible. An appraiser charges a hefty fee,

20   usually requires several days or more to deliver an appraisal, and occasionally turns out to be incompetent, gullible, or corrupt. Persons attempting to inflate the estimated value of a property have been known to engage in patterns of sham sales of the subject property or of nearby properties. They may also act in concert with others to create in the mind of a purchaser or a lender a false

25   impression that properties in the area are appreciating rapidly. Such tactics might also have the effect of feeding artificially inflated values to the automated valuation models that the lender is relying on.

An inexperienced or careless loan officer may be taken in by such schemes. Unfortunately, even a more wary loan officer may hesitate to deny the application or to demand additional information. Lenders are under pressure to avoid the appearance that they are engaging in unfair

5   discrimination against classes of applicants or against neighborhoods which are perceived to be underserved by the banking industry. The lender may fear being sued and being forced at great expense to prove an objective basis for denying an application.

It is therefore necessary for lenders to have more efficient, reliable,

10   objective means of controlling the risk of being victimized by mortgage fraud.

SUMMARY OF THE INVENTION

It is an object of the present invention to improve a lender's ability to control the risks associated with mortgage fraud while also controlling the costs of avoiding those risks.

15   In accordance with these objects and with others which will be described and which will become apparent, an exemplary embodiment of a method for mortgage fraud prevention in accordance with the present invention comprises the steps of maintaining a database of sales prices in the computer system of a plurality of real properties in a geographic area in which the subject real

20   property is located; obtaining from the computer system, valuation history data for the subject property; obtaining, using the computer system, historical sales data for property in the geographic area in which the subject real property is located; computing price ratio data using the valuation history for the subject property and the historical sales data for the subject property in the geographic

25   area in which the subject property is located, and computing a distortion index based on the price ratio data to detect fraud in the mortgage application.

The distortion index may include a temporal distortion index, a spatial distortion index, or a combination of these.

The matrices of data that are assembled in the process of preparing the distortion index may also be reported.

The method may be applied prospectively or retrospectively, with single properties or with large numbers of properties, and with the aid of varying audomated valuation models.

The method may be applied by a person far removed in time and place from the transaction in question and having no particular connection to it. Because a person using the method does not need to single out any neighborhood or other geographical area as a special danger area for fraud, the method in accordance with the present invention helps reduce the danger that a lender would be accused of improper exclusion, such as redlining.

BRIEF DESCRIPTION OF THE DRAWINGS

For a further understanding of the objects and advantages of the present invention, reference should be had to the following detailed description, taken in conjunction with the accompanying drawing, in which like parts are given like reference numbers and wherein:

Fig. 1 is a block diagram of the overall process and information flow for an exemplary method of detecting mortgage fraud in accordance with the present invention;

Fig. 2 is a block diagram of input steps for an example of the method of detecting mortgage fraud in accordance with the present invention;

Fig. 3 is a block diagram of computation steps for an example of the method of detecting mortgage fraud in accordance with the present invention;

Fig. 4 is a block diagram of report steps for an example of the method of detecting mortgage fraud in accordance with the present invention; and

Fig. 5 is an exemplary set of matrices of data reported in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

With reference to Fig. 1, an exemplary embodiment of the method of detecting mortgage fraud in accordance with the present invention utilizes a general purpose computer with access to a database of sales price information pertaining to a geographical area where a parcel of real property is situated. The method obtains the identification of the subject property. The data processor 21 obtains from the requesting party 23 the location and characteristics of the property along with the proposed valuation of the property. The property characteristics and location are used to formulate a query to a database 27 of historical median price data for the zip code, city, and county in which the property is situated. The city may be the "postal city," which is the default United States Postal Service city name for the subject property's zip code. Alternatively, the city may be the situs city, which includes the literal bounds of the city. The results of the query are used to create a matrix of spatial price information. From the requesting party 23 or from the database 27, the data processor 21 also obtains the time and price of a prior sale or valuation of the subject property. The data processor 21 passes this information to the automated valuation model 25, which returns a set of yearly price values for the subject property. The data processor 21 then computes a spatial distortion index, a temporal distortion index, and a total distortion index. Finally, the data processor 21 reports at least the total distortion index to the requesting party.

The exemplary embodiment of the method of detecting mortgage fraud in accordance with the present invention utilizes a general purpose computer with access to a database of sales price information pertaining to a geographical area where a parcel of real property is situated.

The method in accordance with the present invention places the subject property and its requested or alleged value for purpose of sale, loan, or refinance, within both a spatial and a temporal context.

The method constructs a temporal context or "valuation history" for the subject property. This context is both real and virtual. It is real in that it includes all known valuations attributed to prior sales, appraisals, and refinances of the property. It is virtual in that it includes valuations of the property, done by an automated valuation model (AVM), valuing the property at regular intervals, such as yearly, back into the past.

The method also constructs a spatial context for the subject property at several geographic levels, obtaining median sale prices for the property's zip code, city, and county from a high-quality database, the data for which is usually obtained from the county recorder's office. The database is queried for data pertinent to properties sharing the characteristics of the subject property. For example, if the subject property is a single family residence, the database is queried for single family residences. If the property is a condominium or townhouse and appropriately specific data are available, the query will reflect this information. These prices are extracted for the present and the past, for the time periods used in building the temporal context.

In accordance with the present invention, the temporal and spatial contexts together build a price level matrix. One column of the matrix constitutes the prices of the subject property's temporal context. The other columns of the matrix are built from the prices of the various levels of the spatial context.

From the price level matrix it is possible to construct a price ratio matrix. The rows of this matrix are assigned to the time periods of the temporal context; the columns represent the concentric levels of the spatial context. The entries in the matrix represent the ratios of price levels (for the different time

periods) of subject property to zip code prices, subject property to city prices, subject property to county prices, zip code to city, and city to county.

Ratios outside of reasonable contextual levels are said to be distorted. In the price ratio matrix, reasonable variations are possible in the absence of fraud. Individual properties can be more or less valuable than the main body of properties in their zip code, city, or county. Prices in a zip code or city can be higher or lower than those in their corresponding city or county. The ratios can also vary according to basic principles of the business cycle. For instance, it is generally accepted that during boom times prices in affluent areas rise in greater proportions than do prices in middle-class or poor areas, whereas during declining markets, prices in affluent areas are subject to disproportionate declines. Furthermore, price trends in affluent areas tend to "lead" the rest of the market in that they pull out of a recession, or stop rising near the end of a boom, before the main body of the market does so.

Abnormal or distorted ratios may suggest the possibility of fraud in a loan application, and indicate the wisdom of further investigation such as an outside appraisal. If the past history of a subject property suggests that its valuation is between 100% and 120% of the median value in its zip code, but the last two loans on the property were based on valuations which were first 180% and then 250% of the median value in the zip code, this spatial ratio distortion may suggest the possibility of fraud. In the same way, if prices in the property's zip code have been rising at 5% to 7% per year for the past few years, but the alleged valuations of the subject property represent an increase of 40% over the previous year's valuation, this temporal ratio distortion may suggest the possibility of fraud.

The individual temporal ratio distortions and spatial ratio distortions can be used to construct a distortion ratio score which may be expressed in numerical or letter-grade form to suggest the presence of unusual numbers and the possibility of fraud.

With reference to Figs. 2-5, an example of the method of detecting mortgage fraud in accordance with the present invention utilizes a general purpose computer with access to a database of sales price information pertaining to a geographical area where a parcel of real property is situated.

5   With particular reference to Fig. 2, the process begins when information is obtained as shown at reference number 41 about the subject property including its address, the identity of its owner, and physical attributes such as the type of structure, square footage, lot size, and the like. Also obtained (see at 43) is the valuation that is being requested or proposed by the applicant.

10   The process will now be described by way of example as of a time-point of July 1, 2003 for two proposed market values: a realistic value and an unrealistically high value. In this example, it will be assumed that for the property involved, a value of $400,000 is reasonable and $550,000 is unrealistically high.

At this point, the proposed value and the time of the proposed value may

15   be tabulated for the two alternative values as follows:

TIME	PRICE	COMMENT
July 1, 2003	$400,000	realistic requested value
July 1, 2003	$550,000	unrealistic requested value

With reference to Fig. 3, at 45, the process next obtains data about previous sales, appraisals, or refinance valuations for the subject property,

20   along with date and source of those valuations. In this example, the subject property was sold in 1994 for $180,000. This prior sale may be represented as follows:

TIME	PRICE	COMMENT
1994	$180,000	prior sale

The process next calls upon an automated valuation model to produce a valuation of the subject property as of the date of the request and at one-year intervals into the past to the extent permitted by the available data. In this example, the automated valuation model being used is ValuePoint®4 ("VP4"), a

5   well-known service provided by First American Real Estate Solutions. It can be seen that the VP4 automated valuation model has generated a series of estimated price values for the subject property for July 1, 1999 ($268,000) through July 1, 2003 ($395,000). These data, which we may refer to as temporal information concerning the subject property, may be tabulated as

10   follows:

TIME	PRICE	COMMENT
1994	$180,000	prior sale
1995		
1996		
1997		
1998		
1999	$268,000	automated value -- VP4 AVM for July 1
2000	$276,000	automated value -- VP4 AVM for July 1
2001	$335,000	automated value -- VP4 AVM for July 1
2002	$371,000	automated value -- VP4 AVM for July 1
2003	$395,000	automated value -- VP4 AVM for July 1
2003	$400,000	Requested July 1 – realistic
2003	$550,000	Requested July 1 -- unrealistic

At 47, the process next builds one or more columns of information about the economic performance of other properties having various spatial

15   relationships to the subject property. In this example, the process builds columns of median price data for properties having characteristics similar to those of the subject property. For example, median price data are obtained for properties of the same type as the subject property, such as "single-family residence" or "condominium/townhouse." Further refinements based on

20   studying detailed property characteristics are also possible. These data are

obtained or computed from a database of available reported sales, appraisals, and the like in the same zip code, postal city, and county as the subject property. The postal city is the default city name as used by the United States Postal Service for the zip code in which the property is situated. Alternatively,

5   the situs city of the subject property could be used: the city inside whose borders the subject property is legally situated.

These median price statistics are to come from a standard and reliable source. These numbers must apply to the same type of residential property as the subject property (single-family residence, or condo/townhouse, etc.). These

10   numbers are for time periods to correspond with the months and years that appear in the subject property columns. For dates in the most recent year, the process uses tri-monthly medians for the most recent completed three months. For dates in previous years, the process uses yearly medians.

The process unites the information into a spatial price median matrix,

15   which may be tabulated as follows:

TIME	PRICE OF SUBJECT PROPERTY	PRICE OF PROPERTIES IN SAME ZIP CODE	PRICE OF PROPERTIES IN SAME POSTAL CITY	PRICE OF PROPERTIES IN SAME COUNTY
1994	$180,000	$175,000	$150,000	$160,000
1995		$167,000	$139,000	$153,000
1996		$163,000	$134,500	$150,000
1997		$178,000	$136,000	$150,000
1998		$195,000	$138,000	$162,000
1999	$268,000	$244,000	$142,000	$175,000
2000	$276,000	$261,000	$149,000	$192,000
2001	$335,000	$310,000	$170,000	$229,000
2002	$371,000	$388,000	$220,000	$267,000
2003	$395,000	$410,000	$241,000	$297,000
2003	$400,000 (proposed)			
2003	$550,000 (proposed)			

At 49, for each time value (each year), the process computes ratios of the subject property value (price) to the median value reported in the various reference data sets (here, the reference data sets are the median price data for the same zip code, same postal city, and same county as the subject property).

5   The result, which may be referred to as a matrix of spatial variances, may be tabulated as follows:

TIME	RATIO, %, SUBJECT TO ZIP	RATIO, %, SUBJECT TO CITY	RATIO, %, SUBJECT TO COUNTY	RATIO, %, ZIP TO CITY	RATIO, %, ZIP TO COUNTY	RATIO, %, CITY TO COUNTY
1994	103	120	127	117	109	94
1995				120	109	91
1996						90
1997						91
1998						85
1999	110	189	127	172	139	81
2000	106	185	139	175	136	78
2001	108	197	141	182	135	74
2002	96	169	125	176	145	82
2003	96	164	127	170	138	81
2003*	98	166	127	170	138	81
2003**	134	228	152	170	138	81

        * proposed realistic value   ** proposed unrealistic value

10   From this table, it is evident that the historical value and the automated valuation of the subject property are typical of the values of similar properties in the zip code. It also appears that such properties in the subject property's zip code are more expensive than those in the city or county as a whole, and have risen faster in recent years than those in the city or county as a whole.

15   It also is evident that the ratios computed from the unrealistic valuation (134%, 228%, 152%) stand out somewhat from the rest of the matrix. The unrealistic valuation is apparent when measured arithmetically by subtraction. For example, by way of subtraction, 134% is 24% higher than 110%, the

maximum ratio found in the column above it. Similarly, 228% is 31 % higher than 197%, the maximum ratio in the column above it, and 152% is 11% higher than 141%, the maximum ratio in the column above it.

Alternatively, the ratios may be measured arithmetically by division. For example, a comparison by way of division of the realistic and unrealistic value ratios of the subject property divided by their respective maximum prior ratios are as follows:

Realistic	Unrealistic
98% / 110% = 89%	134% / 110% = 122%
166% / 197% = 84%	228% / 197% = 116%
127% / 141% - 90%	152% / 144% = 106%

For purposes of the present example, however, this alternative measurement of ratios by division will not be used in the subsequent steps of the process.

At 53, the process generates a matrix of temporal variances by computing the following ratios for each time period:

Subject value to subject value one year prior;

Zip code median to zip code median one year prior;

City median to city median one year prior;

County median to county median one year prior.

"One year prior" in this example means the complete year previous to the year in question. The temporal variances are tabulated as follows:

time	ratio, %, subject, over year previous	ratio, %, zip, over year previous	ratio, %, city, over year previous	ratio, %, county, over year previous
1994		-8	-4	-6
1995		-5	-7	-4
1996		-2	-3	-2
1997		9	1	0
1998		10	1	8
1999		25	3	8
2000		7	5	10
2001	21	19	14	19
2002	11	25	29	17
2003	6	6	10	11
2003*	8	6	10	11
2003**	48	6	10	11

     * proposed realistic value   ** proposed unrealistic value

It is noticeable that the temporal variance associated with the unrealistic valuation (48%) stands out as inconsistent with the rest of the matrix, while the temporal variance associated with the realistic valuation (8%) does not.

At 51, the process identifies distortions that are associated with the subject property valuation. The spatial distortion is the amount that the subject to zip ratio exceeds the maximum of the entries in the column above it. For the realistic valuation of $400,000, that distortion is zero, since 98% does not exceed 110%. For the unrealistic valuation of $550,000, that distortion is 24%, since 134% - 110% = 24%.

In some zip codes, there might not be enough data on historical prices of comparable properties to produce a reliable matrix. In such a situation, where, for example, the average number of sales in a zip code per year is less than 100, the process may use the subject to city ratio or the subject to county ratio in place of the subject to zip ratio.

At 55, the process computes a temporal distortion, which is defined as the percentage change in subject valuation from the prior year, minus the percentage change in the zip code valuation from the prior year. For the realistic valuation, the temporal distortion is 8% - 6% = 2%. For the unrealistic valuation, the temporal distortion is 48% - 6% = 42%. As before, if the average number of sales in a zip code per year is less than 100, the process may use the subject to city ratio or the subject to county ratio in place of the subject to zip ratio.

It should be pointed out that an alternative index of temporal distortion is computable as the ratio of the percentage change in subject valuation from the prior year to the percentage change in the zip code valuation from the prior year. For the purposes of the present example, however, this alternative distortion index will not be used in the subsequent steps of the process.

At 57, the process computes the total distortion, which is defined as the sum of the spatial and temporal distortions. For the legitimate valuation, the total distortion is 0% + 2% = 2%. For the fraudulent valuation, it is 24% + 42% = 66%.

With reference to Fig. 4, at 59, the process reports this total distortion to the customer. Optionally, at 61, the reported information also includes the spatial and temporal components individually and, if it is deemed appropriate, some or all of the matrix data that gave rise to the computation as shown in Fig. 5.

A total distortion above 50% usually suggests an unrealistic valuation and hence a possible fraud. A total distortion above 100% almost always merits further investigation.

Optionally, the process allows the customer to specify any desired total distortion value which would flag an application as likely to be fraudulent.

If the customer or user requests it, the price, ratio, and distortion matrices can be offered as supporting documentation. If no fraud is suspected, this step will usually not be necessary. If a fraud is suspected, this supporting documentation can be very useful to support and guide any lending or other

5   decision. It is a particular advantage of the present invention that it avoids the inference of redlining or other geographic discrimination, because the person using the method does not need to single out any neighborhood or other geographical area as a special danger area for fraud and because the data produced in accordance with the present invention is "mechanistic" rather than

10   subjective or personal.

Fig. 5 exemplifies documentation the present invention makes available where a valuation is suspected to be fraudulent. Such information can be delivered efficiently to the customer along with other information such as the proposed valuation and the name address of the applicant and the address and

15   relevant information concerning the subject property.

Many lenders will be satisfied with such a score or grade, especially if the findings suggest normal price levels and thus a low likelihood of fraud. In some cases, lenders will request the supporting documentation of the price level matrix and price ratio matrix, especially in cases where a high distortion

20   ratio score suggests the possibility of fraud.

The requirements of the method in accordance with the present invention are not the same as the requirements of existing fraud detection methods. The requirements are twofold: (1) the availability of a high quality automated valuation model (AVM) which is able to value a subject property in current time

25   and at selected times in the past; and (2) a database of median price statistics at several geographic levels such as the zip code, city, and county where the subject property is situated. It is a significant advance to recognize how these methods can be combined and to devise an effective way of combining them to detect mortgage fraud with improved accuracy and efficiency. The method in

accordance with the present invention astutely combines these two components to provide a number of advantages over existing fraud detection methods. For example, the method in accordance with the present invention can provide documentation if a lender is called upon to support a decision on a

5   loan application. The efficiency of automated data processing reduces the cost of producing such documentation when it is called for.

The scores and matrices produced by the method in accordance with the present invention can be requested and transmitted in an automated fashion for one property at a time or for thousands or millions of properties. The

10 method can be used whenever needed, for subject properties and applications throughout the country. Thus, the method can achieve economies of scale.

An entire bundle of loans may be analyzed pursuant to one request. The loans may be proposed loans, or they may be loans that were made in the past. Thus, the fraud sought to be detected may be prospective, or it may already

15 have occurred. One may, therefore, use the present invention to re-evaluate the risk entailed in choices that were made in the past or that were made by others who, at the time, had a very different appreciation of the sensitivity and selectivity with which others later would evaluate the risk of fraud.

The method in accordance with the present invention also embodies a

20 recognition of the tactics and limitations of the perpetrators of mortgage fraud, with a view to making fraud much more difficult to accomplish and rendering fraudulent alleged values easier to detect. For example, perpetrators of fraud ("fraudsters") are frequently able to arrange a series of real or alleged sales, appraisals, or loans for a subject property, often at ascending valuation levels,

25 to support their claims of value for a sale or loan. Fraudsters also often arrange a series of real or alleged sales, appraisals, or loans for a set of properties in a single neighborhood, often at ascending valuation levels, to support their claims of ascending market valuations or prices, and to support their alleged valuation of a subject property for the purposes of a sale or loan.

However, fraudsters will not have the resources to arrange enough false valuations or false sale prices to distort the overall price levels in a well-populated zip code, much less in an entire city or county, because there are many legitimate sales in such areas. Fraudsters also probably will not have

5　the persistence to arrange a history of false valuations or prices on a subject property that extends several years into the past. In general, fraudsters are unlikely to spend three, five, or more years to build a trail of false valuations of a subject property. Combining a spatial distortion index with a temporal distortion index places the concealment of the attempted fraud beyond the

10　resources and beyond the patience of fraudsters.

Thus, an advantage of the method in accordance with the present invention is that it uses a combination of distortion ratio methods to differentiate realistic valuations, which are likely to result from underlying market phenomena, from various types of unrealistic valuations that are likely

15　to result from the behaviors that fit the methods and motivations of fraudsters. The various advantages of the method combine to result in a substantial, novel, non-obvious advance over existing methods of detecting fraud in a mortgage application.

The method in accordance with the present invention is also useful in

20　identifying past transactions which gave rise to anomalous valuations. For example, one may wish to investigate the history of a particular property not only for indications of mortgage fraud, but also for indications that any party to a transaction recognized a value inconsistent with market conditions.

For this purpose, a database of valuation-generating events is

25　maintained in a computer system for a plurality of real properties in a geographic area in which the subject real property is located. A valuation-generating event may be a sale, a valuation pursuant to a mortgage application, or any other event indicating a value placed on the property by any party. A subject property record set including a price (or other valuation) of the

property and the date thereof for at least one valuation-generating event is obtained from the computer. A valuation history data set for the subject property, comprising prices and the dates thereof for several timepoints, is obtained from the computer. This step may involve obtaining values generated

5   by automated valuation models as well as values derived from other sources of data. Finally, historical sales data for property in the geographic area in which the subject real property is located is obtained from the computer. This data is obtainable, for example, from county recorders. To obtain suitable data, a database query may be formulated comprising such information as the

10   location, type, and other economically important characteristics of the subject property, to the extent appropriate in light of the available data.

In the manner described herein, price ratio data is computed using the valuation history for the subject property and the historical sales data for the subject property in the geographic area in which the subject property is

15   located. Also in the manner described herein, a distortion index is computed based on the price ratio data to detect an anomalous valuation in the at least one valuation generating event.

However, instead of computing and reporting a distortion index for a single property for the purpose of detecting fraud in a pending mortgage

20   application, a distortion index is computed and displayed for each of a plurality of conditions so that patterns and relationships may be revealed. For example, for a single identified property the distortion index may be reported as a function of time. Alternatively, a particular timeframe may be selected and the distortion index may be reported as a function of other variables or

25   combinations of variables. The variables may include, for example, the identity of the transferor or the transferee, the identity of the lender or loan officer, the geographical location, the municipal jurisdiction, or any other descriptive information associated with the property or with the transaction. It is possible,

therefore, to associate certain individuals, brokers, lenders, environments or timeframes with certain valuation patterns that signal an anomalous valuation.

Thus, the method in accordance with the present invention becomes a potent tool for risk management in secondary sales of financial instruments, as well as for historical and economic research and other investigative purposes.

It will be appreciated that many variations are possible for practicing the invention without departing from the spirit of the present invention, whose scope is to be limited only by the claims appended to this specification.